

**IDENTIFICATION OF VOCS DISTRIBUTION IN A
PETROLEUM TERMINAL AND MINIMIZATION OF
HAZARDOUS LEVELS ON HEALTH**

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degree of Master of Science in Occupational Health and Safety
Management**

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DECLARATION

I declare that this is my own work, and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Masters of Occupational Safety and Health Management under my supervision.

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Prof.. Lalith De Silva
Supervisor

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Date

ABSTRACT

Identification of VOCs distribution in a petroleum terminal and minimization of hazardous levels on health

Volatile Organic compounds (VOCs) can be found both naturally and manmade environments. Petroleum Industry is a major contributor to the atmospheric VOCs. In this study, a detailed field survey is carried out to investigate the distribution status of VOCs within a petroleum terminal in Sri Lanka. The entire terminal area was identified as operational and non-operational areas according to the zonal categorization of British Standards. The VOC levels of technically selected 99 nos. of locations were measured using a factory-calibrated portable VOC meter. All measurements were obtained when wind speed was less than 1 ms^{-1} to enhance the reliability of measurements. The entire data was analyzed using the Microsoft Excel data analysis tool. The mean value of the non-operational area was 3 ppm which was below the Central Environmental Authority accepted level of 5 ppm for any operations within Sri Lanka. The operational area was further divided into two different series of data because it was observed as distinct two histograms during the analysis. Those were for the exact source of VOCs and the rear vicinity of VOCs (beyond 2 m from the exact source). The average value of VOC in the rear vicinity was 6.9 ppm and it was 43.2 ppm for the exact locations of the VOC sources. Control perspectives were discussed for operational and non-operational areas separately following the available literature. The control perspectives were adsorption, biofiltration for the non-operational area, and catalyst oxidizer and membrane separation for the operational area

Keywords: Volatile Organic Compounds, Health Hazards, Petroleum Industry

DEDICATION

*To my two daughters and husband who sacrificed their “quality time with family”
for my studies*

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LIST OF ABBREVIATIONS

Atomic Absorption Spectroscopy (AAS)

Benzene, Toluene, Ethylbenzene and Xylenes (BTEX)

Benzene, Toluene, Ethylbenzene, Xylenes and Styrene (BTEXS)

Biogenic VOCs (BVOCs)

Central Environmental Authority (CEA)

Central Pollution Control Board (CPCB),

Chronic Obstructive Pulmonary Disease (COPD)

Environmental Protection Agency (EPA)

Electrochemical (EC)

EPA Integrated Risk Information System (EPA IRIS)

European Union (EU)

Flame Ionization Detector (FID)

Gas Chromatography (GC)

International Agency for Research on Cancer (IARC)

Research on Cancer (IARC)

Metal Oxide Semiconductor (MOS)

Nondispersive infrared sensors (NDIR)

particulate matter (PM)

Photoionization Detectors (PID)

Polycyclic Aromatic Hydrocarbons (PAHs)

Thermal Sensor. (TS)

Total Volatile Organic Compounds (TVOC)

Volatile Organic Compounds (VOCs)

World Health Organization (WHO)